Regional Differences in Medieval Chest Construction: A Dendrochronological and Comparative Study of the Buxted, Sussex, and Hindringham and Walcott, Norfolk Pin-Hinged Clamped Chests

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The article explores the construction, decoration and dating of three medieval chests of similar construction type and large capacity, one of which has been considered to be the earliest-known carved chest in England. Dendrochronological dates are obtained for two chests which depart substantially from previous 'stylistic' dates. The shared early lock type of the chests is identified, and their construction details, timber use and decoration are compared with other chests of the same type to show that 'regional' traditions in making chests existed in the thirteenth and fourteenth centuries. Some suggestions are advanced about the uses and rarity of the three chests and the assumption that there is always a lag between styles of decoration on stonework and woodwork is questioned. A number of unresolved questions are identified.

Medieval chests in England are of three main construction types: a) dug-out, b) boarded (in which the boards are held together with nails, pegs and iron straps) and c) clamped (an early form of joinery in which the boards are secured in long mortises in the stiles (uprights) by wooden pegs); mixed types can also be found.[1] (Frame and panelled chests only emerged after 1500.) The three types embody increasing levels of skill and cost but all three types co-existed in England between 1200 and 1500. Preferences, function and affordability affected the choice of type. County surveys in Essex and Suffolk show that boarded chests are by far the most common type surviving today, with clamped chests comprising less than 5% of all medieval chests.[2]

The three chests considered, at St Martin's, Hindringham, and All Saints, Walcott, Norfolk, and at St Margaret's, Buxted, Sussex, belong to a group of over fifty medieval clamped chests with pin hinges from the 1200–1400 period which are being studied by the author (Figures 1–5).[3] The group is found in Sussex (eleven), Kent (seven), Suffolk (five), Westminster Abbey (four), Essex (four) and in smaller numbers elsewhere, mostly in southern England.[4] In the pin hinge the moving part is a batten (rail or cleat)

[1] Chinnery (2016), pp. 50–3, 79–94. Sherlock's (2008) term 'clamped', which goes back to Howard and Crossley (1927), p. 343, is preferred to Chinnery's 'clamp-fronted' since the front, back and sides are all clamped.

[2] Lewer and Wall (1913); Sherlock (2008).

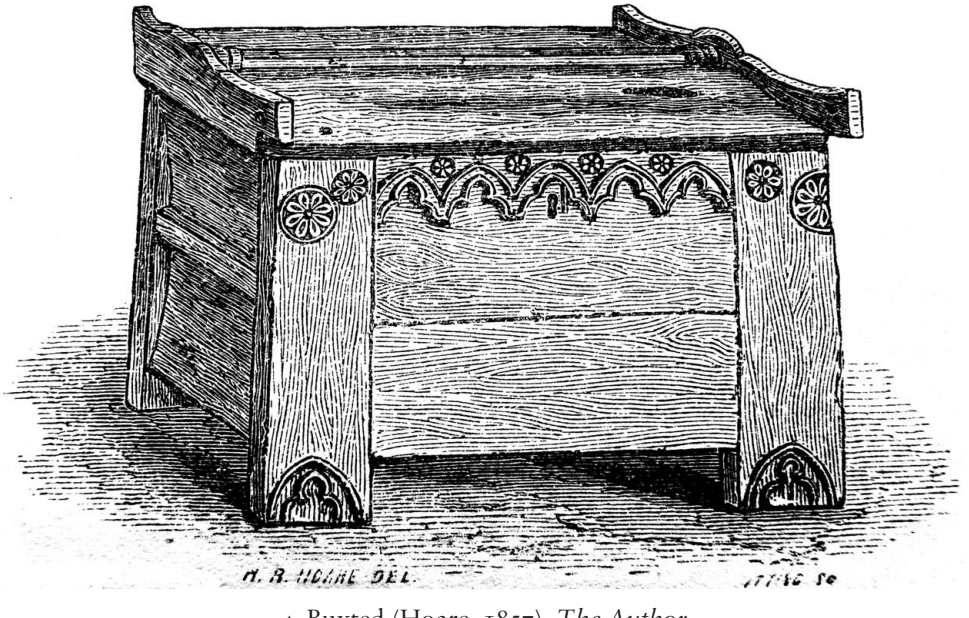
[3] See Johnston (1907), Lewer and Wall (1913), Sherlock (2008), Miles and Bridge (2008), Pickvance (2017, 2018, 2019a, 2019b, 2020). Clamped chests with iron strap hinges are not considered here.

[4] In the author's view the Earl Stonham and Cavendish chests are in Suffolk but not of Suffolk. Earl Stonham is very similar to chests in Sussex and has probably been moved (Pickvance, 2020) and the similarity between the bold tracery facade of the Cavendish chest and that at St Mary Magdalen's Oxford suggests it is imported (Pickvance, 2014).

1 Hindringham, pre-restoration, postcard. *Gavin Simpson*

2 Hindringham. *The Author*

3 Buxted. *The Author*



4 Buxted (Hoare, 1857). *The Author*

5 Walcott. *The Author*

6 Pin hinge, Winchester Cathedral. *The Author*

fixed under the edge of the lid, or (as illustrated here) the side board of the lid itself, with a hole at the rear end, which rotates on an iron rod fixed across a notch in the rear stile (Figure 6). The chests are treated as particularly tall and capacious examples of pin-hinged clamped chests. At a later date, chests with gabled lids were sometimes known as arks, and were often seen as synonymous with food storage, with their lids being detachable and used for kneading dough.[5] Here the term ark is not used for two reasons. The chests have pin hinges in which the iron rod is covered by a protective plate so the lid is not detachable, and the high quality of their decoration and, in one case, the match with features of the church where the chest is located, makes it likely that they were made for ecclesiastical buildings.

I. THE THREE CHESTS IN THE PREVIOUS LITERATURE

Chests are the most common surviving type of medieval furniture and today are found mainly in churches, cathedrals, colleges and museums. Those currently found in churches may have been commissioned or purchased by the church, left by private owners for safekeeping, donated or bequeathed, or have been transferred, e.g. from a monastic property at the time of the Dissolution.

There are various sources of evidence on medieval chests. Henry II in 1166 and Pope Innocent III in 1199 required churches to have a chest to collect money for the crusades. In the latter case the chest was to have three locks, with keys for the bishop, priest and a layman. In 1308 Pope Clement required cathedrals and parish churches to have alms chests, also with three locks.[6] Unfortunately, the presence of three locks today does not suffice to identify a chest as a response to these early edicts since three locks later became a common feature on chests in churches and other institutions.

[5] Chinnery (2016), pp. 87, 306–7.
[6] Lewer and Wall (1913); Sherlock (2008).

A second source of evidence is indirect. The adoption of the doctrine of transubstantiation at the Fourth Lateran Council in 1215 made the main altar a place of the highest symbolic significance and ritual in the Eucharist and led to a corresponding increase in the number and elaboration of vestments and altar furnishings and the provision of piscinas.[7] The rebuilding of chancels, the addition of nave aisles and chantry chapels was related to this but was also an expression of the social status of patrons and influential laymen. It led to an increased number of altars, some of which had a chest to store the accoutrements.[8] The Exeter synod of 1287 created the role of churchwarden and required that churches provide chests for books and vestments (*cistam ad libros et vestimenta*).[9] Although the precise date cannot be taken to apply throughout England, the 1250–1300 period was clearly one in which the increasing extent and value of church furnishings became a concern to the Church.[10]

Documentary evidence describing chests is of limited help. A 1368 inventory of church goods for the Norwich archdeaconry shows that 53% of churches (194 out of 363) had one or more chest: 153 (42%) had one, 37 (10%) had two, and four had three to five. 73% were described as chests for vestments but none mentioned books or money. Almost all the others were described simply as chest.[11] The range of church goods listed was very wide. Most churches had various types of vestment (from copes to surplices), altar frontals, chalices, censers, pyxes, candlesticks, books, crosses and relics. Some of these could have been housed in a vestry, cupboard or aumbry but chests are likely to have housed a variety of types of object, especially as few churches had more than one chest. What is unknown is what these chests looked like: references are at best found to size, timber, colour or the presence of iron straps. Another inventory — of the contents of churches in the Ely archdeaconry for the period 1275–1330 — gives detailed lists of the altar accoutrements and other valuables but records only five chests among 150 churches.[12] The contrast may be due to differences in the wealth of the churches and/or differences in recording practices. In the Ely survey, for example, chests may have been treated as containers which lacked value in themselves.

Another approach is to infer the original uses of surviving chests from physical evidence. Tall, deep capacious chests are most likely to be suitable for vestments and wide, low, shallow chests such as the one in Chichester Cathedral Treasury are likely to have been made for a processional cross.[13] Book chests are sometimes referred to as iron-bound, but iron-bound chests are not necessarily book chests. A few chests have money slots, but they may not indicate an original alms chest but have been added later 'as a cheap way of complying with the general orders of the 16th century for the providing of a Poor Man's Box'.[14] Hence attempts to identify the uses of chests from their appearance are far from straightforward.

[7] Draper (2006), pp. 40, 50–1, 198–206; Morris (1989), pp. 286–301.
[8] Lewer and Wall (1913), pp. 48–9; Howard and Crossley (1927), p. 342.
[9] Binski (2004), p. 176.
[10] Cragoe (2010).
[11] Watkin (1947), author's calculations. The inventory was updated for about 100 years so the date of arrival of the objects listed is not certain.
[12] Feltoe and Minns (1917).
[13] Pickvance (2018).
[14] Cox and Harvey (1908), p. 295.

Turning to the three churches and their chests, St Martin's, Hindringham, is on a site which was 'anciently a rectory which was given between 1200 and 1226 to Norwich priory by the bishop' but is built in the Decorated style.[15] There is no record of the arrival of the chest but the 1368 inventory of church goods lists under Hindringham 'cista pro vestimentis' which could easily refer to the present chest given its dimensions, as discussed below. The Hindringham chest, mis-named 'Wintringham', was included by Johnston in his extensive 1907 survey of church chests with a drawing based on a photograph sent to him.[16] He described it as 'exceptionally interesting' and stated that the body 'is obviously very early, probably not later than 1200, and probably ten or years or so earlier.'[17] In his 1920 book Roe included a drawing of the chest. He dated it to the last quarter of the twelfth century and said that 'eliminating archaic relics of pre-Norman origin, it is possible that [it is] the earliest coffer remaining in England which is decorated with any carving.'[18] Finally, in his 1929 book, Roe dated the Hindringham chest to the late twelfth century and described it as unique and as 'what may be called the doyen of all carved receptacles of medieval times in the country'.[19] Cautley dates the chest to the early thirteenth century 'because of its wide stiles'.[20] It was not referred to by Eames (1977) in her survey of medieval furniture but for Pevsner and Wilson 'it may well be the earliest chest preserved in England' and is 'certainly Norman'.[21] If the chest is Norman it would pre-date the church, and the churchwarden, Mr Roy Bullen, has suggested that the chest might have come from the nearby Binham Priory, a Norman, Benedictine foundation.[22] The surprising feature of these references is that although Cautley's photo illustrates the 'penwork' decoration (discussed below), which is exceptionally rare, only Pevsner and Wilson comment on it.[23]

The oldest parts of St Margaret's, Buxted are Early English and the first writers judged the chest to date from 1260 or from 1250–75 and to be 'of great age, doubtless coeval with the church'.[24] A new chancel was commissioned by Sir John de Lewes in 1292 and the church has undergone considerable restoration.[25] Nairn and Pevsner describe the chest as a 'memorable late thirteenth century piece' and note the trefoil arches on the font ('late C13?') which also appear on the chest, thus advancing the date of the chest by thirty or forty years.[26] The chest is likely to have been made for Buxted church since its decoration matches that of other features of the church, as discussed below. Nairn and Pevsner footnoted a suggestion that it may not be a parish chest and Antram and Pevsner subsequently suggested that 'it may rather have been a reliquary'.[27]

[15] Watkin (1947), II, p. 193; Pevsner and Wilson (1997), pp. 553–4.
[16] Johnston (1907).
[17] Ibid, pp. 262–3
[18] Roe (1920), p. 4 and plate 11.
[19] Roe (1929), pp. 92–3.
[20] Cautley (1949), p. 209.
[21] Eames (1977); Pevsner and Wilson (1997), p. 554.
[22] Personal communication, July 2014.
[23] Cautley (1949), p. 153; Pevsner and Wilson (1997), p. 554.
[24] Hoare (1857), p. 213; Johnston (1907), pp. 291–2; Cox and Harvey (1908), p. 301.
[25] Hoare (1857), p. 211.
[26] Nairn and Pevsner (1965), p. 465.
[27] Ibid, p. 465; Antram and Pevsner (2013), p. 297.

All Saints, Walcott, is described as 'all Late Dec to Early Perp' by Pevsner and Wilson who add that 'Dec can go on very late.'[28] They refer to a 1427 bequest for building the nave, and suggest the chancel was built before the nave and the tower. They do not mention the chest and it has only recently been noticed. Walcott church was part of the Norfolk archdeaconry and was thus not part of the Norwich survey of 1368, and the chest's lack of decoration makes it unamenable to stylistic dating.

II. THE THREE CHESTS COMPARED

The three chests will be compared with each other and with other pin-hinged clamped chests, focusing on their original features.[29] Table 1 presents the basic data on the chests.

Table 1 The three chests compared

	Hindringham	Buxted	Walcott
Height, width, depth; internal height (cm)	100(+9),* 138, 80; 64 (*Adjustment to take account of losses to feet)	114, 144, 87; 68	110(+15) (adjusted), 160, 85; 59
Front stiles: width, taper and depth	27, non-tapering 5	27, taper from 6 to 5	30/32, taper from 6 to 3 and 6.5 to 4
Lid construction and profile	Four boards in shallow curve	Three boards, gabled. Roll moulding on top	Six boards, gabled
Upper edge of sides of lid	Shallow convex curve	Very shallow concave curves	Bow-shaped
Number of boards (front, back, left, right) and joint type	3,3,3,3 All V except lower two boards of front which are butted	2,3,3,3 All V	3,3,3,3 All V
Mid-height side rail	No	Yes	No
'Lips' above grooves	None	Canted type	None
Base boards and joints	3, side to side, V	5, front to back, V	4, side to side, V
Original lock of sliding bolt type	Yes (now lost)	Yes (wooden cover remains)	Yes (now lost)
Later lock plate	Concave-sided	None	Concave-sided

[28] Pevsner and Wilson (1997), p. 705.

[29] The main losses and repairs are as follows. The Hindringham chest underwent restoration in 1971 which included repairs to the lid, stiles, base boards and battens underneath, re-making the pin hinges and till lid and re-assembly with new pegs. A photo of the chest after restoration appeared in the *Eastern Daily Mail* of 18 January 2017. On the Buxted chest, the pin hinges are broken, the outer parts of the right hand stiles have split off, and the mid-height, right hand side rail is missing. On the Walcott chest, some boards in the lid and base, and the pin hinges, have been replaced. There are also changes to the locks and losses to the feet.

Table 1 The three chests compared (continued)

	Hindringham	Buxted	Walcott
Façade decoration	Incised Norman arcading, applied columns, 'penwork' design with hexafoils in frame, iron nails	Carved gothic arcading, rosettes, iron nails	None (cleaned)
Foot decoration	Large hexafoils. Curved inner side possibly original	Carved gothic arch	Unknown (mostly missing)
Oak	Mixed slow-grown (German) and fast-grown (probably local)	Fast-grown (local)	Slow-grown (probably Baltic)
Dates	1250–75 (dendro)	1318–50 (dendro)	1350–1400 (est.)

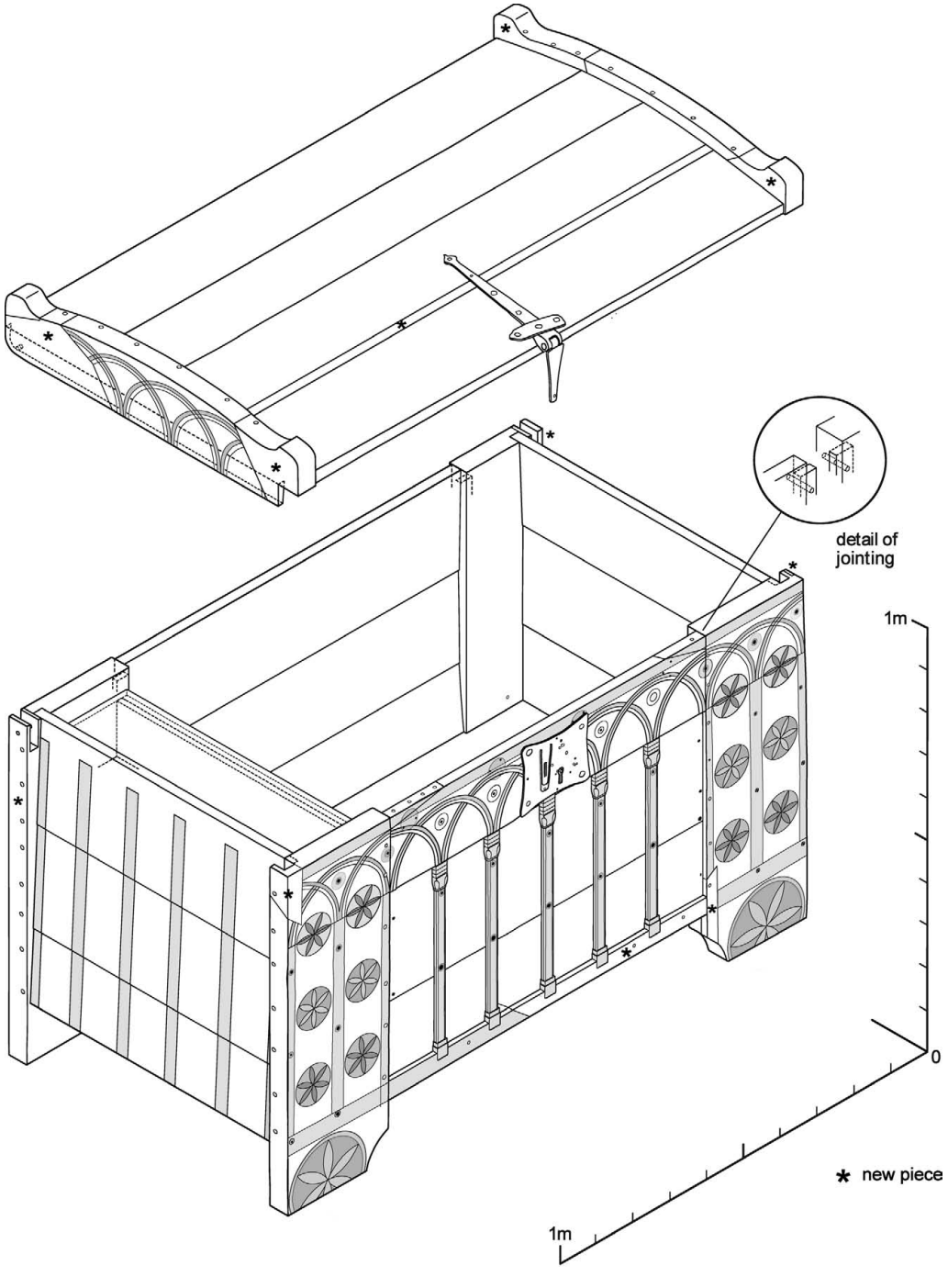
A. CONSTRUCTION

At 100 cm or more high, the three chests are taller than all other pin-hinged clamped chests, and with depths of 80–97 cm, they are deeper than all except Bloxham, Oxon. (89 cm) and Laneham, Notts. (80 cm), which are both flat-lidded. In internal volume they are, with Bloxham, among the four most capacious chests in the group (Figure 7).[30]

The lids of the three chests differ in their profiles, in the number of boards they use and in the shape of the sides (Figures 8 and 9). The roll moulding on the Buxted chest stands out as a rare example of an architectural feature on a chest and matches the trefoil-headed piscina in the church's north transept whose 'inner moulding is a roll with a square fillet.'[31] On the Buxted chest the hole for the original pin hinge can be seen on the left hand side, with a stout nail just below to reinforce the stile. The hole would have been covered by a protective iron plate for which some nail holes can be seen. Such a plate can be seen in the photograph of the Hindringham chest taken prior to restoration (Figure 1). Each corner of the lid of the Buxted chest has a pair of oblique holes of about 11 mm diameter which may have been for ropes to attach the chest to a cart for transport (Figure 9).

All three chests have broad stiles of 27–32 cm which is within the typical range for clamped chests of 20–40 cm. In section they taper slightly at Buxted which is usual, and sharply at Walcott which is not. This shape provides the necessary depth to accommodate the mortises for the ends of the front, back and side boards which tenon into them and are held with wooden pegs. At Hindringham the stiles are parallel-sided in section, which is exceptional.

[30] Comparisons exclude the chests in Westminster Abbey some of which are of exceptional size (up to 4 m wide).
[31] Hoare (1857), p. 210.

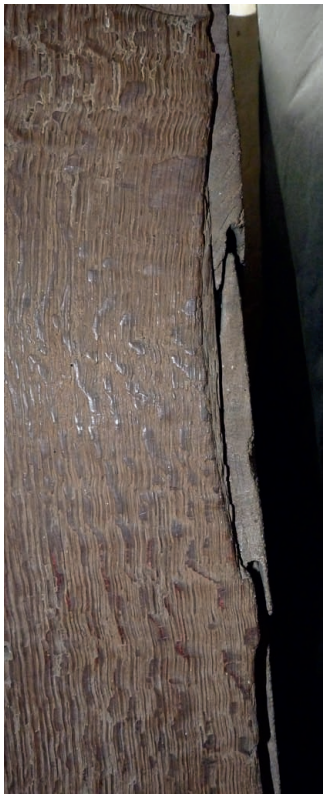


7 Hindringham, isometric drawing. *Richard Sheppard*

8 Walcott, lid. *The Author*

9 Buxted, lid with roll moulding. *The Author*

The front, back and sides of the chests are almost all made of three boards which are joined to each other by lateral 'V-joints' in which a V edge on one board fits into a groove in the edge of the adjacent board (Figure 10); the exception is the use of dowelled butting discussed below. This type of joint allows the timber to expand and contract across the grain. The sides of the chests slope inwards to provide space for



10 Buxted, V-joint. *The Author*

11 Walcott, right hand side. *The Author*

12 Buxted, mid-height side rail. *The Author*

the sides of the lid. The Walcott chest is unusual in that the pegs from the side boards into the stiles are placed obliquely into the joint between them: the reason for this is unclear but it is equally functional in comparison with the normal placement of the pegs perpendicular to the sides of the stiles (Figure 11). The Buxted chest had mid-height side rails pegged to the front and back stiles to strengthen the side joints (Figure 12). Despite their depth the other two chests have plain sides which shows confidence in the rigidity of their structure. Another way of strengthening the side joints is the applied grid made of battens, as on the early fourteenth century Climping, Sussex chest.[32]

The base boards are held in grooves in the lowest boards of each wall and are either set front to back as at Buxted and Hindringham or side to side as at Walcott. At Buxted the lowest boards in each wall are the same thickness as the top boards (4 cm), whereas at Hindringham and Walcott the top board is 2.5 cm thick and the lowest boards gradually thicken out to 3.5 cm (Figure 7). The Walcott chest has bevelled features

[32] Pickvance (2019a, 2020).

13 Walcott, bevel, no lip. *The Author*

14 Buxted, sliding bolt cover from the rear, canted lip. *The Author*

where the wall has been thinned above the groove (Figure 13).[33] At Buxted the lower boards are shaped to make a canted 'lip' above the groove, whereas the other two chests have flat internal faces (Figure 14). The base boards are not themselves pegged but once the chest is assembled and pegged, they are clamped tight and in all three cases have survived with minor repairs. Stout battens run underneath at right angles to the base boards. At Buxted these battens are supported on through tenons running from front to back at each side.

All three chests have a narrow, lidded box or 'till' for small items clamped into grooves in the front and back stiles on one side. These have a single section; other designs have an additional, concealed, lower section.

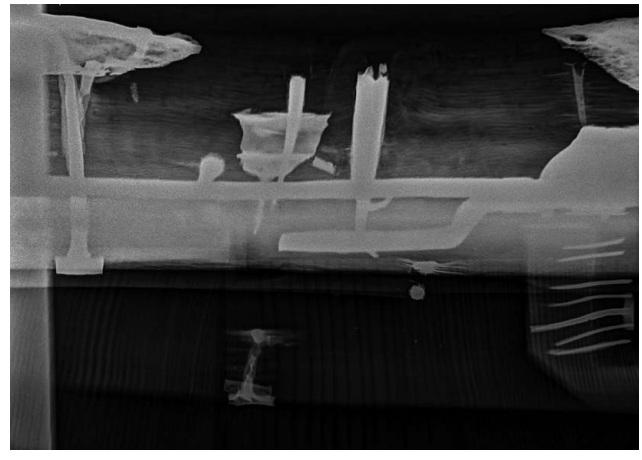
[33] These are also found in the chest at Aldbury, Herts and in Lower Saxony where a variety of forms of 'internal shaping' were in use; Stülpnagel (2000), pp. 81–88.

15 Buxted, sliding bolt cover from above. *The Author*

B. LOCKS

The interpretation of locks is difficult as medieval chests rarely retain their original locks. In his survey of early chests, Johnston wrote that he was 'convinced that the locks and other ironwork are in nearly every case original' but he in fact noted more exceptions than this suggests.[34] Today the Hindringham and Walcott chests both have locks with hinged hasps and concave-sided lock plates. The Walcott example lacks a hasp guard. Lock plates of this type, a Germanic design, are known from 1300 to 1600. Both lock plates are likely to be pre-1400. There is some evidence that the concavity of the sides becomes more pronounced over time, which would suggest the Walcott lock was the earlier, but since it is not original this has no bearing on the age of the chest.[35] In contrast, the Buxted chest has the clearest evidence of its original 'sliding bolt' lock (Figures 14 and 15). In this type, turning the central key moved a long bolt with prongs, four in this case, which engaged with four rigid iron staples that were fastened to the top of the lid and protruded through four holes.[36] Two staples survive and are now fixed to a batten added on top of the lid. This repair may have been required because the holes in the lid had become worn and the staples and bolt prongs had become misaligned (Figure 9). The long bolt and its wooden cover were fixed behind the facade with five nails; the cover has four apertures which ensure that the staples locate in front of each prong. The wooden cover is extant but radiographs revealed that the bolt had been removed. Evidence of sliding bolt locks has been found on almost all pin-hinged clamped chests in Kent and Sussex from the period 1240–1340.[37] A radiograph of the Horsham, Sussex chest shows one of the four prongs (Figure 16). Three original staples, into which such prongs engaged, survive on the Stedham, Sussex chest (Figure 17).

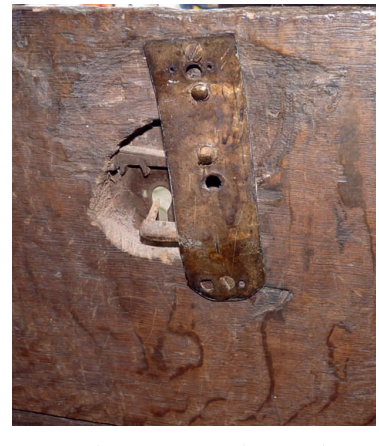
[34] Johnston (1907), p. 306.
[35] Baumeier (2012); Stülpnagel (2000), p. 111.
[36] The space for a rectangular iron escutcheon with four nails can be seen in Figure 3; other escutcheon shapes are also found in Sussex: round at South Bersted and lozenge-shaped at Horsham (Pickvance, 2017).
[37] Pickvance (2018, 2019a).



16 Horsham, prong on sliding bolt lock. *The Author*

17 Stedham, staples on lid for sliding bolt lock. *The Author*

18 Hindringham, lid. *The Author*



19 Walcott, scooped area above lock. *The Author*

The other two chests had the same type of lock as can be seen from the (filled) holes for staples close to the edge of the lid (four at Hindringham, two at Walcott; Figures 8 and 18); from the holes close to the top edge of the front board, probably connected with fixing the bolt and/or the wooden cover; and from a circular scooped area to the rear of the facade behind and above the current lock plate (Figure 19). Similar scooped

areas can be seen at Bloxham and Salisbury Cathedral. The implication is that both chests originally had a sliding bolt lock. The fact that some of the earliest chests had a single lock, rather than three as is often thought, was noted long ago by Roe.[38] Eames suggests that the number of locks was more to do with custodianship than with the value of the contents which in the present case would imply a great degree of trust in one person.[39] Sliding bolt locks without wooden covers also exist on boarded chests in Suffolk (Icklingham St James and Polstead) and Essex (Debden) and on a dug-out chest at Fairsted, Essex.[40]

C. TIMBER AND DENDROCHRONOLOGY

All three chests are made of oak, sawn or cleft radially, which reveals the medullary rays. This method of conversion maximizes the strength of the boards and reduces the risk of warping and cupping. As shown in Table 1 the two Norfolk chests both contain slow-grown oak, whereas the Buxted chest is made of fast-grown local oak. The presence of fast-grown, probably local, oak in the stiles and top front board of the Hindringham chest raises the question of whether it is in original condition or has had a major repair, which will be addressed later.

The importation of slow-grown oak from Germany, Poland and points further east dates back to the thirteenth century and followed the period of population growth to 1340 when woodland was estimated to cover 7% of the land area of England.[41] This was associated with the rise of the Hanseatic trade which was favoured by the English crown to secure raw materials such as timber, iron, fur, and flax.[42] At Westminster Abbey German oak is found in thirteenth century chests and Baltic oak in fourteenth century chests which suggests that slow-grown oak was first imported from the closest sources.[43] The straight, close grain of slow-grown oak made it lighter in weight and easier to work than English oak and it was available in cleft boards (and later in sawn boards).[44] Sea transport was cheap but data on prices are not available until 1400–1420 when the wholesale price of Baltic timber in Poland was half of its price in England.[45] 'Wainscot' remained a large scale import until the nineteenth century.[46] In the author's research slow-grown oak has not been found in pin-hinged clamped chests in Sussex, Surrey, Kent or Hampshire but has been found in a few cases in Suffolk and Norfolk, although in Suffolk fast-grown oak is more common. The incidence of slow-grown oak is therefore regionally variable. Unfortunately, there is no map of the distribution

[38] Roe (1902), pp. 16–18.
[39] Eames (1977), p. 134.
[40] In Germany sliding bolt locks (without covers) are found on a small number of Luneberg Heath chests which are dendro-dated 1261 (chest 203) to 1381 (chest 411), a much later date; (Stülpnagel, 2000), pp. 115, 266, 276, 280, 282, 346 and 350 (Table 3, item 22).
[41] Rackham (2006), p. 65.
[42] Salzman (1952) pp. 245–7; Childs (2002); Simpson (2014).
[43] Miles and Bridge (2008).
[44] Tyers (2004); Harrison (2015); Simpson (2014). Slow-grown oak boards which taper across their width (as in the two upper front boards of the Walcott chest, see Figure 5) can often be found. This may have been an economy measure since two tapered boards placed side by side and head to tail would create a rectangle, thus avoiding further sawing and waste of timber.
[45] Postan (1987).
[46] Bowett (2012), pp. 242–251.

of German and Baltic oak in the UK in medieval times. Simpson notes its use in St Albans Cathedral and Oxford as well as in places closer to east coast ports such as Hull and Kings Lynn.[47]

Dendrochronology measures the felling date and provenance of timber by comparing patterns of tree ring growth in new samples with those found previously. These may be either site chronologies, or regional chronologies based on a set of site chronologies. Matches are given by t values, with a t value of 4.0 nowadays taken as indicating a match and higher values indicating closer matches.[48] Since bark is never found on chests, and most of the soft sapwood has usually been removed, an estimate of the years of missing sapwood has to be made. When the heartwood/sapwood boundary is found, between nine and forty-one years is added for English oak, eight to thirty-eight years for German oak and eight to twenty-four years for Baltic oak, to give a probable felling date range with 95% confidence limits.[49] When the boundary is not found, the felling date can only be given as 'after X', where X is the date of the latest ring found, to which the minimum sapwood estimate of eight or nine years is added. For construction dates two years is usually added for the seasoning of the 5 cm thick timber used in the stiles of clamped chests.

The dating of the timber of the Hindringham chest was limited to the slow-grown timber as the fast-grown timber had too few rings for analysis. Results were obtained for the rear board of the lid and the middle board of the right hand side which had last measured rings of 1240 and 1241 respectively. Since no sapwood was found, an estimated felling date of 'after 1249' for both boards, was made, which is roughly 1250–75. The best matches were found with regional chronologies for Schleswig-Holstein (t=7.2), Gdansk (7.0) and Northern Lower Saxony (6.3) and with site chronologies for Peterborough Cathedral (6.9, with German timber), Ely Cathedral (6.9, with Baltic timber) and many other sites where imported oak was used.[50] Subsequently Dr Leuschner kindly compared the '**HNDRNGHM**' chronology with chronologies for seven areas within Lower Saxony, of which the strongest match (t=7.5) was with the 'Coastal area North Sea' chronology.[51] The 'after 1249' felling date is in line with the view suggested above that the current lock, of post-1300 design, is not original. The new felling date is considerably later than the pre-1200 dates proposed by Roe and Johnston.

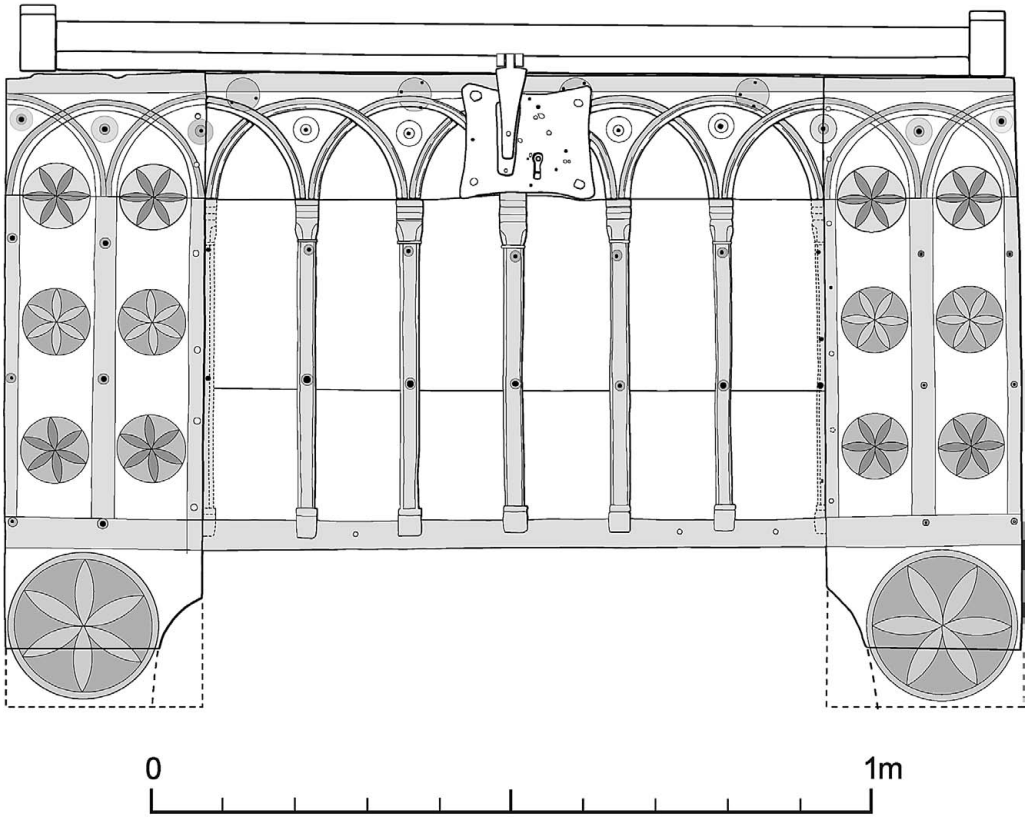
Two samples from the Buxted chest yielded felling dates. The first included a heartwood/sapwood boundary and led to a probable range of 1318–1350. This too is substantially later than the 1250–75 'stylistic' dates proposed by earlier writers. This sample produced closest matches with individual sites in Hampshire and Kent (t=5.6 and 5.4). The other sample lacked sapwood and gave a felling date of 'after 1273'. Its closest matches were with sites to the west of Sussex.[52] The authors of the analysis noted that at this earlier date there were very few site chronologies in Sussex compared

[47] Simpson (2014).
[48] Bridge and Miles (2018), here Appendix A.
[49] Ibid.
[50] Ibid.
[51] Leuschner (2019), here Appendix B.

with neighbouring counties so the result cannot be considered definitive; in other words, a Sussex source for the second sample cannot be ruled out, in which case the two samples could have had different sources.[53]

D. DECORATION

The decoration of the three chests varies greatly. The most distinctive feature of the Hindringham chest is its multiple forms of decoration: fine 'penwork' lines, dark and light stain or paint, incised (rather than relief) carving, applied columns and iron nails. The term penwork is used here to refer to the combination of finely-scored outlines in the design with shading which may be ink, stain or paint. The decoration has not received the attention from researchers that it deserves since Johnston relied on photographs and Roe's drawing omitted the penwork decoration. The complex design, which is now faint, has been carefully recreated in a measured drawing by Richard Sheppard (Figure 20). Close to the top edge of the top board of the facade are the signs



20 Hindringham, facade, decorative scheme. *Richard Sheppard*

[53] The Walcott chest was not dendro-dated due to its late discovery.

21 Hindringham, arch. *The Author*

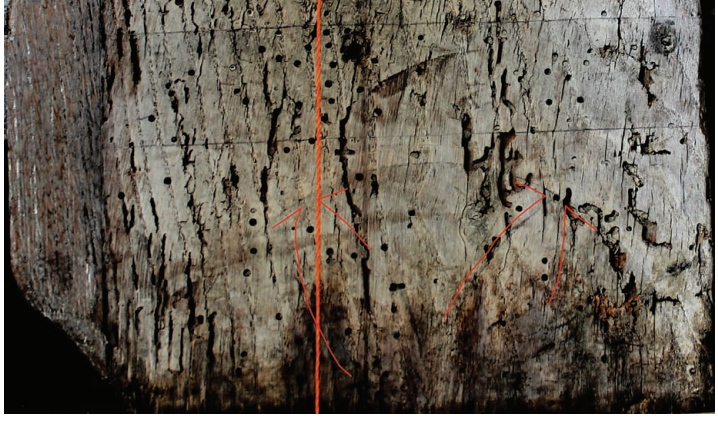
of four circular iron plates that concealed the fixings for the bolt and wooden cover. Below these, the double-incised, intersecting, round-headed arches, which create pointed arches at their intersections, rest on applied columns with capitals and bases. Today the upper arc of each arch is shaded dark (perhaps originally black?) and the lower arc is pale, reinforcing the decorative effect. The intersecting arcading continues onto the stiles but in penwork alone. At the centre of each arch and above each of the columns is a nail head within a penwork circle (Figure 21). Originally, the facade had three rows of nail heads with penwork circles: ten in the top row (five on each side of the lock plate); eleven in the upper middle row (two on each stile and seven on the middle) and nine in the lower middle row. There are two further nail heads in the lower section of frame on each stile. The nail heads are likely to have been larger than they are today and to have been tinned and to have shone, as would the circular iron plates. The intersecting arch design continues onto the sides of the chest. There are faint traces of arches in penwork on the sides of the lid and below them on the sides of the chest are six scribed columns, four wide and the outer ones narrow, the latter still dark (Figure 7).

The most intricate penwork appears on the front stiles. Under the upper arch on each stile is a central nailhead in a penwork circle (as on the central upper board). Below this is a dark (originally black?) central 'trunk' with six penwork hexafoil ('daisywheel') roundels arranged in three contrasting pairs on either side, one above the other (Figures 20 and 22). Cautley's photograph shows the remains of colour in the now empty parts of the hexafoil roundels.[54] On either side of the trunk are two narrower dark columns. If the narrow applied columns (now missing) adjacent to the stiles were dark the arcading would be of uniform thickness across the facade. There is a partial frame which extends as a dark penwork band above the feet, up the outer edges of the stiles to the arcading, and above the arcading. The feet show the evidence of the upper half of a large original hexafoil roundel which is displaced from the 'trunks', no doubt in order to avoid overlapping the carved inner sides of the feet (Figures 20, 23 and 24). The presence of this decoration makes it likely that the whole stiles were not painted in a single background colour. How the penwork drawing was

[54] Cautley (1949), p. 153.

22 (above)
Hindringham, right stile.
The Author

23 Hindringham, left foot. *Richard Sheppard*



24 Hindringham, right foot. *Richard Sheppard*

23 Rochester Cathedral, freehand roundels on choir-stalls. *Jacob Scott*

done is not clear; it appears to involve both scribe lines and small areas filled with colour. The Museum of London has a 'metal pen' dated to the 'thirteenth century(?)' which might have been the sort of tool used.[55]

This type of penwork has also been found at Westminster Abbey. Howard and Sauerberg report that in paintings 'incised guidelines were employed in the setting out of architectural features, such as arcading, borders and other geometrical elements, or to demarcate areas where decoration, often gilding, was to be applied subsequently' and they cite examples of such 'early scorings', 'presumed metal-point drawing' and 'ruled incisions' in the Westminster Retable (*c.* 1259–69) and the Painted Chamber (1263–66).[56] This type of work contrasts with the *c.* 1227 choir-stalls at Rochester Cathedral where the roundels lack scored outlines and are painted freehand on a plaster or white lead base; this may be an earlier form of decoration (Figure 25).[57]

In recent years hexafoils found in English sixteenth- and seventeenth-century buildings have been interpreted by some writers as apotropaic and it is tempting to apply this interpretation to the Hindringham chest as it is likely to have had valuable contents worth protecting.[58] There is a more general debate among architectural and art historians about whether geometrical figures such as squares, circles and hexagons found in the design of religious buildings, and the numbers associated with them, were the result of practical needs or had the symbolic meanings found in ancient and medieval texts.[59] This cannot be entered into here but it can be noted that, in the thirteenth century, roundel decoration of many kinds was popular, and was used extensively in the heads of gothic arches in windows and on woodwork such as

55 Alexander and Binski (1987), p. 383, cat. 422.
56 Howard and Sauerberg (2015), pp. 218–9, 244.
57 Tracy (2006), p. 139. Most of the other surviving roundels have been defaced by later scoring.
58 Easton (2016).
59 Hiscock (2000, 2007) advocates the latter view.

choir-stalls. Kent and Sussex chests show a diverse range of geometrical circular designs: whorls, stars, hexagonal, cross-pattées, segmented, etc. To interpret hexafoils as apotropaic, rather than as part of this wider set, is speculative. On the other hand, Cuisenier's view that geometrical designs simply reflect the spread of the compass excludes their having any symbolic significance and is not convincing either.[60] Their meaning thus remains elusive. Medieval craftsmen may have adopted motifs because they were part of inherited traditions, irrespective of meanings previously, then, or later, associated with them.

The lower two boards of the facade show signs of white paint or lime wash which also appears with grey on the restored part of the rear stile. Mr Bullen, the churchwarden, says that 'red and green paint was to be seen in very small areas of the chest in the 1950s/60s, mostly where the grain of the wood was open or rough, not enough to form any kind of pattern.'[61] These colours were lost at the time of the restoration. This area could have had a red and green background for the shining nail heads. The popularity of red and green are shown by data on the 244 mass vestments recorded in the 1368 Norwich archdeaconry inventory: 82 were red, 36 white, 28 green, 24 black, 20 gold and 16 blue; for copes mentioned separately the figures were: red 23, green 9, blue 8, etc.[62]

The lid shows extensive open furniture beetle workings or 'worm tracks', which imply that it was once covered by paint, varnish, or some other type of covering. No similar worm tracks are visible on the front and sides which may mean that they were not painted. The stiles, however, have numerous flight holes, probably due to the ease of penetration of the fast-grown oak, but no open worm tracks. This supports the idea that the penwork on the stiles was their only decoration.

The Buxted chest has several types of relief carved decoration (Figures 3 and 4).[63] There is a row of five carved, slightly pointed, arches with cusping on the upper front board above which are four 6.5 cm carved eight-petal rosettes, with similar 9 cm and 12 cm rosettes at the top of each stile, and a further similar arch placed laterally on each foot. Each of the four smallest rosettes has a central nail, no doubt adding to the decorative effect as at Hindringham and Chichester Cathedral but there is no row of iron discs (Figure 26).[64] The cusped arches match those on the church's font which is considered 'late 13C?' by Nairn and Pevsner.[65] There are no nail holes or other signs of applied columns below the arcading as at Hindringham which raises the question of whether the Buxted chest had painted columns beneath the arches. Today there is no sign of colour on the chest, but the lid shows extensive open worm tracks, which implies that they were made underneath paint, varnish, or some other type of covering. As at Hindringham, there are no similar worm tracks on the front and sides. The 1318–1350 felling date range and combination of cusped gothic arcading and roundels on the Buxted chest is also found on the Climping chest (dendro-dated to the early

[60] Cuisenier (1977), pp. 181–3.
[61] Personal communication, May 2017.
[62] Watkin (1947), II, pp. liv and lx.
[63] The drawing brings out the carved decoration but the curved boards in the sides and extra large lid are in the artist's mind only.
[64] Pickvance (2019a).
[65] Nairn and Pevsner (1965), p. 465.

26 Chichester cathedral, facade. *The Author*

fourteenth century). The only other Sussex chest to have been dendro-dated is the Chichester Cathedral chest which has small roundels but no gothic arcading and has an earlier date, 1256–1288.[66]

The Walcott chest lacks carved decoration and any paint must have been removed at the time of the restoration and thorough cleaning it has undergone. Typically, restoration involves staining to conceal new timber. However, although there are furniture beetle flight holes in the body of the chest, there are no signs of open worm tracks.[67] The Walcott chest has not been dendro-dated so any judgement of its date is risky. Sliding bolt locks have not yet been found in England on chests dendro-dated after the mid-fourteenth century, the latest date for the Buxted chest. This could be because of a bias towards pre-1350 chests in the examples chosen for dendro-dating, but in northern Germany sliding bolt locks have been reported until the late fourteenth century.[68] A mid- to late fourteenth-century date for the chest would be consistent with the architectural style of the church.

[66] Pickvance (2019a).
[67] None of the three chests has had any decorative iron strapwork. This can be seen on the clamped pin-hinged chests at Chobham, Surrey, East Lockinge, Oxon., Laneham Notts., and Poslingford, Suffolk; Sherlock (2008); Pickvance (2019b, 2020).
[68] Stülpnagel (2000), pp. 276, 280, 282, 350.

E. THE INTEGRITY OF THE HINDRINGHAM CHEST

Having described all aspects of the Hindringham chest, it is now possible to address the question of the originality of the chest. When both imported and fast-grown oak (which is assumed to be English here) is found in a chest, the question has to be asked whether the chest was either imported or made in England from imported timber, and was later repaired in England. When the author first studied the Hindringham chest he wondered whether it had undergone a radical rebuilding in which English fast-grown oak was used to replace both the stiles and the top front board. Clamped chests with replaced top front boards, probably due to forced entry and the need to replace locks are not unusual — there are examples at Felpham, Sussex and Ranworth, Norfolk — but the replacement of stiles is uncommon. The fact that the stiles of the Hindringham chest lack the usual tapered section could suggest a repair by someone who was not a maker of such chests. However, there are a few examples of clamped chests with parallel-sided stiles, including the late thirteenth century Merton College, Oxford chest (with iron strap hinges) and the fourteenth century Cavendish, Suffolk chest.

It seems most likely, therefore, that the use of two types of timber is original to the chest. First, the combination of imported German and fast grown English timber, in chests is not unknown. At Westminster Abbey, the Large Chest, a 4.11 m wide, 1.13 m deep clamped chest with iron strap hinges, is an example whose German oak has a felling date range of 1239–1271, which overlaps with the dates for the Hindringham chest.[69] Second, all of the penwork, incised arcading, applied columns and the ledge below them on the Hindringham chest, is on slow-grown German oak and, as will be shown, these decorative features have their closest matches in England on the St John's Hospital, A and B, Canterbury chests which are made of local oak and date from the same period.[70] Another connection with the St John's Hospital chests is the partial frame. Complete rectangular incised frames are found on the Kent group of chests and at Chichester Cathedral (Figures 26–28).[71] Third, the fast-grown oak is used for the stiles, where 5–6 cm thick timber is needed. A hypothesis to explain this is that the only slow-grown German oak boards the maker had available were less than 5 cm thick, so he was forced to use local, fast-grown oak where 5 cm was needed. This suggestion does not explain why fast-grown oak was used for the 2.6 cm thick top front board. However, this board has the typical scooped-out rear surface (as at Walcott, Figure 19) and fixing holes for a sliding bolt lock, the type considered original to the chest. These features are evidence that the dark, fast-grown oak, is original too. The use of dowelled butting between the lower two boards of the front of the chest, when elsewhere on the chest V-jointing is used, is also puzzling but a likely explanation is that it provides a more solid base for the applied columns than V-jointed boards which expand and contract across the grain.[72] Last, the decorative use of nails with

[69] Miles and Bridge (2008), pp. 19–20, 26.

[70] The closest north German comparisons are with a chest with grounded round-headed arches and grounded (not applied) columns dendro-dated 1230, and a chest with two large and two small incised hexafoils, dendro-dated 1320; Stülpnagel (2000), pp. 60, 205, 374–5.

[71] Pickvance (2018, 2019a).

[72] The term 'butt joint' is a misnomer since the juxtaposition of straight-edged boards does not join them: jointing is provided here by dowels and by the pegged mortise and tenons.

27 St John's Hospital A, facade. *The Author*

28 St John's Hospital B, facade. *The Author*

discs across the whole width of the front of the chest is further evidence that the fast-grown oak is original, not the product of a later repair. There are thus good reasons to believe that the combination of imported German oak and fast-grown, presumed English, oak in the chest is original to it.

III. THE THREE CHESTS IN A BROADER CONTEXT

It has been shown that the three chests had the same types of original hinge and lock, but differed in their likely dates of manufacture, the origin of the timber used, and in their decoration and construction. This section addresses the question of dating and then expands the comparison to provide evidence of distinctive regional traditions of chest manufacture in the 1240–1400 period.

A. DATES AND STYLISTIC LAGS

Until now, the Hindringham and Buxted chests have been dated on the basis of their carving styles, with, in the case of the former, an adjustment made for wood carving lagging behind stone carving. The idea of a stylistic lag was introduced by Roe and explanations for it include that commissioners insisted that furniture should match the decoration of earlier features of church interiors, that earlier styles had a symbolic importance[73] and/or that craftsmen had a degree of autonomy and adopted their own preferred designs and that these reflected the lower status of furniture and furniture-makers.[74] The felling dates of the oak of the Hindringham and Buxted chests obtained here have moved their dates forward by sixty to seventy-five years from the 1190–1200 and 1260 suggested by Roe and Johnston, to 1250–1275 and 1318–50. This appears to suggest that both chests show stylistic lags and that these are greater than previously thought.[75]

Roe wrote that 'whatever the "follow on" of woodwork, as compared with stone carving might be, there is no doubt that the Hindringham relic antedates the earliest of our thirteenth century carved coffers by some years.'[76] Roe's dating of the Hindringham chest assumes that Norman stone carving did not extend beyond 1200. Pevsner also describes the style of carving on the Hindringham chest as Norman but does not date it. However, he goes on to date the intersecting round-headed arches in a piscina at Pulham St Mary, Norfolk to the mid-thirteenth century, which implies that Norman stone carving extended well beyond 1200, at least in Norfolk.[77] If this dating is correct, it shows that round-headed arcading was found contemporaneously on stonework and on the chest, so it is not necessary to invoke the idea of a stylistic lag. This implies that the 1200 end-point for the Norman style in stonework is a rough guide only and that local stylistic traditions existed in stonework, reflecting autonomy exercised by commissioners at parish level, an approach advanced by Draper.[78]

[73] Thanks to Lesley Milner for this idea.
[74] Roe (1929), p. 93; Mercer (1969), pp. 42–50; Pickvance, forthcoming.
[75] Perhaps surprisingly, despite this re-dating the Hindringham chest remains one of the four earliest carved chests in England - the others being at St John's Hospital, A and B (1237–69, 1250–82) and Laneham, Notts. (1250–75); Pickvance (2018, 2020).
[76] Roe (1929), p. 93.
[77] Pevsner (1962), pp. 286 and Fig 21b.
[78] Draper (2006), pp. 42–7, 179–195.

Roe did not study the Buxted chest and the idea of a stylistic lag has not been proposed there. Johnston dated the chest to 1260, when the church was believed to have been founded, and well before the 1318–1350 dendro date. The chest's Decorated cusped gothic arcading is also found on the church's stone carving, and the roll moulding with fillet on the lid of the chest matches the moulding on the piscina in the north transept. It follows that the carving on the Buxted chest does not demonstrate a lag relative to the carving of the church's stonework. Last, the Walcott chest has not been dendro-dated but, based on its construction and sliding bolt lock, a 1350–1400 date has been proposed. These dates mean it could have been made for the church given its 'Late Dec to Early Perp' stone carving.

Although it has been shown that neither the Hindringham nor the Buxted chest provides an example of stylistic lag, it is not being proposed that such lags cannot exist, but only that they cannot be taken to be a general rule, and that before they can be claimed to exist, dates for stonework must be based on local practices, rather than on universally applicable date ranges for decorative styles.

B. REGIONAL TRADITIONS OF CONSTRUCTION AND DECORATION

A second result of this study was to uncover some possible regional differences in the manufacture of clamped chests.[79] In her study of medieval furniture, Eames writes that 'if we look at chests, we see examples … of a range of forms' and argues that 'this range is indicative of the freedom of medieval work, and if we look within each form we find that differences of detail rather than close similarities, are what strikes the eye'.[80] She attributes this to 'the way in which labour was organized in the Middle Ages, with small groups of men who were free to produce individual solutions to different problems'.[81] Whereas Eames studied eighteen chests of diverse types, the author's study is larger, focuses on a single type of chest and leads to different conclusions. The three chests studied here, viewed against the wider study, provide evidence that distinctive regional traditions in making pin-hinged clamped chests existed. Six additional East Anglian pin-hinged clamped chests are referred to here: at Ranworth, Norfolk, and Badingham, Icklingham All Saints, Poslingford, Sweffling and Tattingstone, Suffolk.[82] The Badingham chest had a shallow curved lid, now missing; all the others have flat lids. None has a carved facade but Poslingford has decorative ironwork. The locations are well scattered: Walcott and Ranworth are both east of Norwich, the other places are in north Norfolk and south west and east Suffolk. These chests will be compared with those in Sussex (eleven) and Kent (seven).[83]

[79] The term regional is used loosely and includes 'local'.
[80] Eames (1977), p. 238.
[81] Ibid.
[82] Sherlock (2008).
[83] The Sussex chests are at Bosham, Buxted, Chichester Cathedral, Climping and Felpham (both in the cathedral), Coombes, Horsham, Midhurst, Rogate, South Bersted and Stedham; Johnston (1907); Pickvance (2017, 2019a, 2020). The Kent chests are at Boughton, St John's Hospital, Canterbury (two), Graveney, Norton, Wormshill and Yalding (Pickvance, 2018).

Table 2 Regional traditions in the manufacture of pin-hinged clamped chests[84]

	East Anglia	Sussex	Kent
Timber	Imported and local	Local	Local
Joints between front boards (where two or more)	V-joints: two Butted: four	V-joints	V-joints
Joints between boards of sides	Butted and dowelled: six V-joints: two	V-joints	V-joints
Bottom boards placement	Side to side: five (incl. two Norfolk); two replaced	Front to back	Front to back
Joints between bottom boards (where two or more)	Butted and dowelled: three V-joints: two Not seen: two	V-joints	V-joints
Lip above groove	None: six Canted: one	Mainly canted	Always quarter-round
Flat lids with raised borders	Three out of five	None	None
Sliding bolt lock	Yes: three (all Norfolk), possibly without cover No: three Uncertain: two	Yes (with cover) (ten) Uncertain: one	Yes (with cover) six; No (one)
Facade decoration	Plain (seven) and Norman arcading (one)	Plain (three); chip-carved roundels (five), or roundels and carved gothic arcading (three)	Plain (one), incised gothic arcading (very small incised roundels) (six)

The contrasts are as follows. First, imported slow-grown oak is found not only at Hindringham and Walcott but also in some other pin-hinged clamped chests in East Anglia (e.g. Ranworth, Poslingford and Sweffling), whereas it is not found at all among those in Sussex (eleven) and Kent (seven). This is probably in part a function of the quality of the local oak. In Sussex, for example, oak has the reputation of being the 'Sussex weed' as it grows readily and the lid, front and back boards of medium and large chests are typically made of single boards. It is recorded that '619 oaks were sent from Sussex to Dover Castle in Edward II's reign [1307–27]'.[85] In Kent, on the other hand, oak supplies appear to have been poorer as the lids, front and back boards of

[84] Numbers do not always sum to the total number of chests due, for example, to lost base boards and lids.
[85] Pelham (1929).

29 Graveney, quarter-round lip. *The Author*

the larger chests are made of two or three boards. In East Anglia fast-grown oak was used in some chests, e.g. at Badingham and Icklingham All Saints, which could be a way of keeping costs down on less prestigious chests, a distinctive local tradition, or due to their manufacture at a different (probably later) date. This implies that the Hindringham, Walcott and other chests had the degree of prestige that warranted the use of a superior type of oak.

A second contrast is in the joints used in the chests. In Kent and Sussex (including Buxted), except in shallow chests where the base is a single board, the bases are typically made up of a series of short boards placed front to back with V-joints. In East Anglia there are two patterns. The Badingham, Icklingham, Ranworth, Sweffling and Tattingstone chests have butted and dowelled joints in the walls and bases, and the base boards are placed lengthwise, whenever they consist of more than one original board. At Walcott and at Hindringham (except for the two upper front boards), on the other hand, the four walls are made of V-jointed boards and the bases are made of V-jointed boards placed lengthways. In this respect, therefore, the Hindringham and Walcott chests deviate from the other five. The reason for this division remains to be determined. It could be due to their greater size, to a workshop working within a distinctive tradition, or to their being earlier chests with V-joints later being displaced by butted and dowelled joints.

A further difference in construction is that the inside faces of the lower boards into which the base boards fit can be shaped in three ways: leaving them flat, or paring them to make either a canted lip or a quarter-round lip (Figures 7, 13, 14 and 29). The quarter-round lip is found in all seven Kent chests and two out of nine Sussex chests. The canted lip is found in seven out of nine Sussex chests (including Buxted).[86] In contrast, all of the East Anglian chests except the Tattingstone chest (canted lip), lack any lip, which is consistent with their belonging to a different tradition of making.

[86] One Sussex chest has a mixture of quarter-round and canted lips, and on another the inside cannot be seen.

30 Sweffling, lid with border. *The Author*

A fourth contrast is that on the three Suffolk chests with original flat lids the lids have frame-like raised borders which are carved in the solid on all four sides (Poslingford) or along the front and back edges, with flat applied battens nailed at each side of the lid (Icklingham All Saints, and Sweffling; Figure 30). The Ranworth chest lacks a border and no borders exist on any of the pin-hinged clamped chests in Kent or Sussex.

A further contrast concerns the wooden covers on sliding bolt locks. These survive in one or more chests in Kent and Sussex but none have yet been found in East Anglia. This is a difficult contrast to prove since, when covers are absent, their original presence depends on interpreting nails and bolts (or signs of them) that might have been used for attaching the wooden lock cover.

Last, there are marked differences in decoration between two groups of chests. In Sussex there are five chests with two, three or four chip-carved roundels (Chichester cathedral, Felpham, Midhurst, South Bersted and Stedham).[87] The Buxted chest is one of three Sussex chests which combines roundels with one or more gothic arches (the others being Climping, dendro-dated 'after 1294', and Horsham) and these probably all date from the early fourteenth century. Hexafoils are the most common type of roundel in Sussex. In Kent full-height trefoil gothic arcading is dominant, either incised (five examples) or grounded with applied columns (St John's Hospital B); roundels occupy a secondary place but their size increases from very small to small over the 1237–1340 period.

The Hindringham chest (1250–1275) is the only pin-hinged clamped chest with a carved facade so far found in Norfolk and Suffolk and is also unique among the group in having round-headed arcading. It cannot, therefore, be said to show a regional style. Its use of incising, fine penwork and contrasting colour is also found in Canterbury

[87] Pickvance (2017, 2019a, 2019b, 2020).

31 St John's Hospital A, detail. *The Author*

on the St John's Hospital A and B chests which are dendro-dated to 1237–69 and 1250–82 and at Westminster Abbey (1259–69) as mentioned earlier.[88] These chests have incised 'outline' trefoil gothic arcading (chest A) and grounded arcading and applied columns (chest B), with fine incised stripes and lozenges on the columns of gothic arches and small roundels with cross-pattées (Figure 31). (The preference in East Kent for trefoil gothic rather than the round-headed arches in Norfolk could be because Canterbury Cathedral was instrumental in diffusing the gothic style.) The similar dates suggest that fine penwork and incising were early forms of furniture decoration before deeper forms of carving, such as chip-carving, were adopted. Hexafoils are the sole type of roundel on the Hindringham chest. The Walcott chest is entirely plain and lacks evidence of former paint.

It is therefore proposed that these six differences are evidence of regional differences in construction and decoration which suggest, contrary to Eames, that each of the three areas has its own tradition of making which implies organized working rather than 'individual solutions'. These regional differences suggest the enforcement of continuities in workshop practices and designs by workshop masters. In Norfolk and Suffolk, differences in construction have been found which may be due to sub-regional differences and/or differences in the dates of construction of the chests.[89]

[88] Pickvance (2018). Using the OxCal method the felling dates are 1242–58 and 1253–71. This method is based on the relationship between the number and width of the heartwood and sapwood rings, and generally gives a narrower range (Miles 2006, Tyers 2008).

[89] A number of other features have been noted which require further exploration: the shape of the lids, the use of through tenons, oblique side pegs, the bevelled feature, and the occasional presence of stiles which do not taper in section.

C. USE AND ORIGINS

The article started by noting the exceptional size of the Hindringham, Buxted and Walcott chests. The argument that the Kent chests, which, at around 85 cm high, 150 cm wide and 70 cm deep are less capacious, were suitable for storing vestments and books applies a fortiori to the present three chests.[90] Lewer and Wall record a reference to a 'gret old arke to put in vestyments' in the vestry at St Mary's, Warwick in 1464.[91] However, the evidence of the 1368 Norwich archdeaconry survey suggested that a *cista pro vestimentis* is likely to have served a variety of uses given the extent of the valuables needing protection in churches in the thirteenth century. Antram and Pevsner's suggestion that the Hindringham chest was made as a reliquary chest does not explain why such a tall and deep chest was necessary. Reliquaries preserve objects of exceptional symbolic value in small containers such as monstrances, and are very rare in parish churches.[92] The fourteenth-century Winchester Cathedral mortuary chests are very small.[93] The Hindringham chest may thus be the vestment chest listed in 1368, rather than a transfer from Binham Priory or another church. Likewise, the author considers it most likely that the Buxted and Walcott chests were also vestment chests but accommodated other objects too. All three chests have a very smooth finish on their internal surfaces, as do all the chests in the group, which is indicative of the high quality of their manufacture and a concern to protect the contents, whatever they were.

The question arises, therefore, as to why pin-hinged clamped chests should have been made for churches in the three locations. One advantage they had over dug-out and boarded chests is that they were more able to be made in great depths, such as 80–90 cm. It is risky to draw conclusions when the number of surviving chests is small but it is possible that wealth is part of the answer to this question. Both Buxted and Hindringham churches were above average in their wealth as measured by 'spiritualities' in the 1291 *Taxatio*, a valuation on which the papal tax granted to Edward I for his planned crusade was to be based. Hindringham church was appropriated to the Benedictine monks of Norwich Cathedral and was valued at £28 6*s* 8*d*, which was well above the £12 8*s* 5*d* average value for parishes in the Norwich Archdeaconry.[94] Buxted church was valued at £32 (with a chapel), which was well above the average value for Chichester Archdeaconry parishes (13 2*s* 0*d*), but it was a peculiar of the Diocese of Canterbury and the Archbishop was the patron, which suggests it had influential wider connections.[95] In contrast, Walcott church had a 1291 value of £14 6*s* 8*d*, close to the Norwich average value for parishes, and had a secular patron.

The connection of Buxted and Hindringham churches with monastic cathedrals may be significant. Mercer states that the majority of pre-1300 chests are ecclesiastical

[90] Pickvance (2018).
[91] Lewer and Wall (1913), p. 49.
[92] Thanks to Peter Draper for this point.
[93] Jervis (1976).
[94] Davnall et al. (1992), p. 103; www.hri.ac.uk/taxatio. Appropriation was the process by which religious houses acquired control of parish churches and their income. Measures to curb the process were adopted in 1268. How this was connected to economic development and modernising movements in the Church, and the motivations of donors, clergy, bishops and religious houses is discussed by Rasche (2000).
[95] Hoare (1867).

in origin and links this to the 'collective wealth' and 'exceptional' situation of the 'monastic and cathedral clergy.'[96] Luxford's analysis of Benedictine art and architecture in the west of England from 1300 to 1540 supplements the standard view that rectors and parishioners paid for the furnishings of the chancel and nave respectively.[97] He provides evidence of official and unofficial commissioning by various levels of cathedral official and argues that in this way parish churches could acquire fine objects and have major repairs undertaken. He notes the fragmentary evidence and does not mention chests specifically, but as mentioned earlier they are not always recorded.

An additional channel by which churches acquired furnishings is personal gifts. Ackley, describing church treasuries, refers to 'a system of gifting and memorializing on the individual, dynastic, and institutional scale. An object donated to a treasury generated both heavenly rewards and earthly commemoration. Documentation buttressed the claim.'[98] This is borne out in the 1368 Norwich archdeaconry inventory of church goods which mentions that Hindringham church had a cope made of 'cloth of gold', a fabric interwoven with gold thread, that it was one of only eighteen churches (5% of the total) to do so, and that it was the gift of Alexander de Totington, Prior (1382–1406) and Bishop of Norwich (1407–1413).[99] There is no direct evidence that the decorative Hindringham and Buxted chests were commissioned or partly financed by the monastic cathedrals of Norwich and Canterbury, but the churches had the necessary institutional connections, so it is a hypothesis worth considering. Conversely, the plain Walcott chest could reflect the church's lack of a similar institutional connection.

The lack of records with detailed descriptions of chests means that many unanswered questions remain about pin-hinged clamped chests. Why did chests with this early form of joinery emerge at a time when boarded chests bound with plain iron straps were the norm? Did they represent an advance by joiners into a field previously occupied by carpenters and where their skills allowed them to make a product that fulfilled a new need?[100] The dates of the chests are consistent with the mid to late thirteenth century expansion of valuable objects needing safe storage. How secure were they? Did their pin hinges and single key sliding bolt locks make them insecure, or were they kept in spaces such as sacristies and treasuries, which could be locked from inside by a guard, and where there was a single trusted keyholder?[101] These questions all relate back to the uses of this type of chest. The reasons for the emergence of different regional traditions of making and decoration also require exploration. Hopefully the discovery of new chests, more documentary evidence, and further dendro-dating will allow these questions to be pursued.

[96] Mercer (1969), pp. 31 and 39.
[97] Luxford (2005), pp. 94–113; Binski (2004), pp. 176; Draper (2006), p. 179; Cragoe (2010).
[98] Ackley (2014), p. 6.
[99] Watkin (1941), I, p. 90 and II, pp. liv and 193.
[100] Eames (1977), pp. 232–4 shows that carpenters and joiners both made furniture and windows, but that does not rule out the sort of competitive process suggested here.
[101] Draper (2003).

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APPENDICES

A. Bridge, M. C. W. and Miles, D. H., *The dendrochronological dating of the chest, St Martin's Church, Hindringham, Norfolk* (Mapledurham, Oxon: Oxford Dendrochronological Laboratory, 2018).

B. Leuschner. H. H., *The results of matching the Hindringham and Lower Saxony chronologies*, unpublished report, 2019.

C. Bridge, M. C. W. and Miles, D. H., *The dendrochronological dating of a chest in the church of St Margaret the Queen, Buxted, East Sussex* (Mapledurham, Oxon: Oxford Dendrochronological Laboratory, 2017).

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APPENDIX A

Oxford Dendrochronology Laboratory Report 2018/46: *The Dendrochronological Dating of the Chest, St Martin's Church, Hindringham, Norfolk* (TF 984 364)

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December 2018

SUMMARY

Two series matched each other — the outer section of the middle right side board, and the front lid board. The resulting 81-year sequence dated to AD 1160–1240, the strongest matches being against material from northern Germany. One series ended in 1240, the other had a partial ring formed in 1241. It is likely that the boards were trimmed close to the heartwood-sapwood boundary, which suggests that the trees used were likely felled in the second half of the thirteenth century. This opinion is reinforced by the fact that previously dated chests using German wood found in this country are of the thirteenth century, with later chests using wood from further east in Poland.

BACKGROUND TO DENDROCHRONOLOGY

The basis of dendrochronological dating is that trees of the same species, growing at the same time, in similar habitats, produce similar ring-width patterns. These patterns of varying ring-widths are unique to the period of growth. Each tree naturally has its own pattern superimposed on the basic 'signal', resulting from genetic variations in the response to external stimuli, the changing competitive regime between trees, damage, disease, management etc.

In much of Britain the major influence on the growth of a species like oak is, however, the weather conditions experienced from season to season. By taking several contemporaneous samples from a building or other timber structure, it is often possible to cross-match the ring-width patterns, and by averaging the values for the sequences, maximise the common signal between trees. The resulting 'site chronology' may then be compared with existing 'master' or 'reference' chronologies. These include chronologies made by colleagues in other countries, most notably areas such as modern Poland, which have proved to be the source of many boards used in the construction of doors and chests, and for oil paintings before the widespread use of canvas.

This process can be done by a trained dendrochronologist using plots of the ring-widths and comparing them visually, which also serves as a check on measuring procedures. It is essentially a statistical process, and therefore requires sufficiently long sequences for one to be confident in the results. There is no defined minimum length of a tree-ring series that can be confidently cross-matched, but as a working hypothesis most dendrochronologists use series longer than at least fifty years.

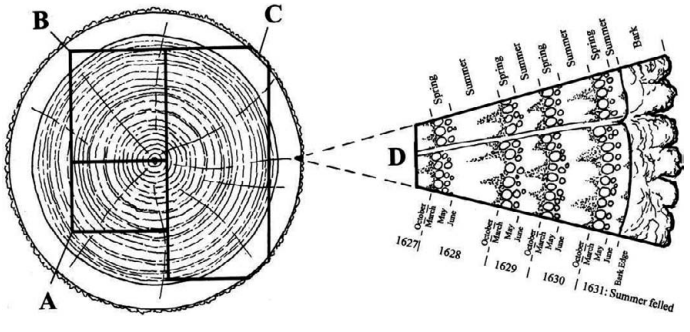
The dendrochronologist also uses objective statistical comparison techniques, these having the same constraints. The statistical comparison is based on programs by Baillie and Pilcher (1973, 1984) and uses the Student's *t*-test. The *t*-test compares the actual

difference between two means in relation to the variation in the data, and is an established statistical technique for looking at the significance of matching between two datasets that has been adopted by dendrochronologists. The values of 't' which give an acceptable match have been the subject of some debate; originally values above 3.5 being regarded as acceptable (given at least 100 years of overlapping rings) but now 4.0 is often taken as the base value in oak studies. Higher values are usually found with matching pine sequences. It is possible for a random set of numbers to give an apparently acceptable statistical match against a single reference curve — although the visual analysis of plots of the two series usually shows the trained eye the reality of this match. When a series of ring-widths gives strong statistical matches in the same position against a number of independent chronologies the series becomes dated with an extremely high level of confidence.

One can develop long reference chronologies by cross-matching the innermost rings of modern timbers with the outermost rings of older timbers successively back in time, adding data from numerous sites. Data now exist covering many thousands of years and it is, in theory, possible to match a sequence of unknown date to this reference material.

It follows from what has been stated above that the chances of matching a single sequence are not as great as for matching a tree-ring series derived from many individuals, since the process of aggregating individual series will remove variation unique to an individual tree, and reinforce the common signal resulting from widespread influences such as the weather. However, a single sequence can be successfully dated, particularly if it has a long ring sequence.

Growth characteristics vary over space and time, trees in south-eastern England generally growing comparatively quickly and with less year-to-year variation than in many other regions (Bridge, 1988). This means that even comparatively large timbers in this region often exhibit few annual rings and are less useful for dating by this technique.



Section of tree with conversion methods showing three types of sapwood retention resulting in A *terminus post quem*, B a felling date range, and C a precise felling date. Enlarged area D shows the outermost rings of the sapwood with growing seasons (Miles 1997, 42)

When interpreting the information derived from the dating exercise it is important to take into account such factors as the presence or absence of sapwood on the sample(s), which indicates the outer margins of the tree. Where no sapwood is present it may not be possible to determine how much wood has been removed, and one can therefore only give a date after which the original tree must have been felled. Where the bark is still present on the timber, the year, and even the time of year of felling can be determined. In the case of incomplete sapwood, one can estimate the number of rings likely to have been on the timber by relating it to populations of living and historical timbers to give a statistically valid range of years within which the tree was felled. For this region the estimate used is that 95% of oaks will have a sapwood ring number in the range 9–41 (Miles 1997), whilst the estimate currently used for Baltic timbers is 8–24 (Tyers 1998) and for German medieval timber 8–38 (Hillam et al. 1987).

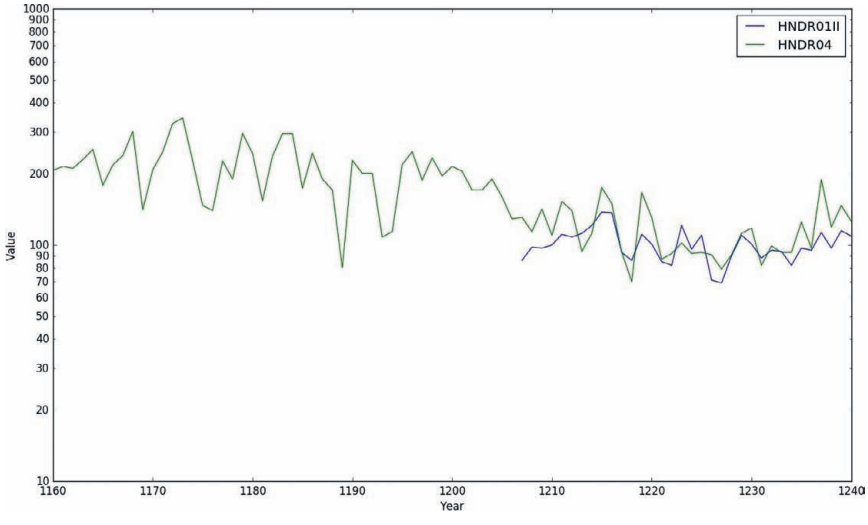


Figure 1 Plots of the ring width series for samples **hndr01ii** (blue) and **hndr04** (green) showing their similarity in growth. The y-axis is width of ring (0.01 mm) on a logarithmic scale.

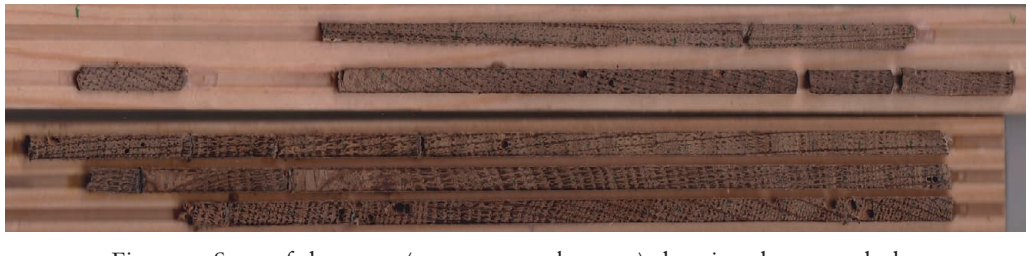


Figure 2 Scan of the cores (01–05 top to bottom) showing the worm holes and breaks encountered.

SAMPLING

Sampling took place in November 2018. Samples were labelled (prefix hndr) and were polished with progressively finer grits down to 400 to allow the measurement of ring-widths to the nearest 0.01 mm. The samples were measured under a binocular microscope on a purpose-built moving stage with a linear transducer, attached to a desktop computer. Measurements and subsequent analysis were carried out using DENDRO for WINDOWS, written by Ian Tyers (Tyers 2004), with additional software written by Dr Chris Bridge.

RESULTS AND DISCUSSION

Details of the samples and their locations are given in Table 1. As Figure 2 shows some boards are represented by a number of fragments (02 and 03 each had four pieces), and only the information for the longer sections measured are presented here. The boards were generally rather thin for coring, and some were badly degraded by worm, hence only five boards were sampled. Cross-matching between the series resulted in only one pair of matches.

The outer section of core 1 (**hndr01ii**), although only 34 years long, did cross-match with **hndr04** ($t = 5.5$), as shown in Figure 1. It also dated independently, giving $t = 6.9$ *v* GER_SH1; 4.4 *v* BRATHEN5; 4.0 *v* HMC_t165 (see Table 2 for references). These represent a side board and a lid board. Although it is not known how many rings may have been lost between the inner and outer sections of 01, it was not thought to be many. Curiously, although the short outer section dates both against 04 and independently, the longer inner section does not date,

When added to **hndr04**, the new site master **HNDRNGHM** gave stronger matches (shown in Table 2). The sample had an additional partial ring for 1241, but is important as it gives the outside date for two boards within a year of each other, suggesting, as found elsewhere (see for example Miles and Bridge 2008) that these boards are close to the heartwood sapwood boundary.

Although based on only two boards, the end dates of 1240 and 1241 (Figure 3) indicate a likely felling date in the earlier part of the second half of the thirteenth century, with the wood used, or possibly the chest itself, coming most likely from north Germany, or a close by part of the Baltic region. The stiles are however made from very fast-grown oak, and are more likely to be local English oak, so it is more likely that the chest was made locally, incorporating imported boards.

There is some additional support for the date from the origin of timber found in the Westminster chests (Miles and Bridge 2008) where some thirteenth-century chests were found to have used German timber, whilst later chests in the fourteenth century were using wood from further east in the Baltic region.

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Table 1 Details of samples from the chest at St Martin's Church, Hindringham, Norfolk

Sample number	Timber and position	Date of series	h/s boundary date	Sapwood complement	No. of rings	Mean width (mm)	Std devn (mm)	Mean sens	Felling date range (AD)
hndr01i	Inner section, middle right side board	—	—	—	72	1.24	0.21	0.13	—
* **hndr01ii**	Outer section, middle right side board	1207–1240	—	—	34	1.01	0.16	0.13	After 1249
hndr02	Top right side board	—	—	—	72	1.31	0.27	0.18	—
hndr03i	Inner section, front lid board	—	—	—	53	1.52	0.48	0.22	—
hndr03ii	Outer section, front lid board	—	—	—	87	1.27	0.35	0.23	—
* **hndr04**	Rear lid board	1160–1240	—	—	81	1.69	0.65	0.25	After 1248
hndr05	Bottom rear board	—	—	—	91	1.09	0.45	0.24	—
* = included in site master **HNDRNGHM**		**1160–1240**	—	—	**81**	**1.66**	**0.67**	**0.23**	After 1249

Key: h/s bdry = heartwood/sapwood boundary — last heartwood ring date; std devn = standard deviation; mean sens = mean sensitivity.

Table 2 Dating evidence for the site chronology HNDRNGHM AD 1160–1240 against dated reference chronologies

County or region	Chronology name	Reference	File name	Spanning	Overlap (yrs)	*t*-value
Regional Chronologies						
Germany	Schleswig-Holstein	(Eckstein et al. 1970)	GER_SH1	436–1968	81	7.2
Baltic	Gdansk regional chronology	(Wazny, pers. comm.)	GDANSK	996–1985	81	7.0
Germany	Niedersachsen Nord	(Leuschner pers. comm.)	GER_NORD	915–1873	81	5.9
Site Chronologies						
Germany	Peterborough Cathedral	(Tyers and Tyers 2007)	PCNBt69	944–1230	71	6.9
Baltic	Ely Cathedral	(Arnold et al. 2005)	ELYCSQ07	1097–1303	81	6.9
Baltic	Hanseatic cog	(Bonde and Jensen 1995)	VEGBY-26	1109–1370	81	6.6
Baltic	Hull Magistrates Court	(Tyers 1998)	HMC_T165	1078–1369	81	6.5
Baltic	Ewerby chest	(Howard pers. comm.)	EWECSQ01	1174–1315	67	6.3
Baltic	South Moreton Manor, door	(Miles and Bridge forthcoming)	SMDoorX	1128–1382	81	6.0
Baltic	Chapel Lane Staith, Hull	(Tyers 2000)	CLS2000	1110–1393	81	5.9
North Germany	Bridge Street, Ipswich	(Hillam 1985)	BRIDGEST	1128–1293	81	5.7
Baltic	King Charles Gate, Christ Church, Oxford	(Miles and Bridge 2012)	KGCHASGT	1070–1433	81	5.6
Baltic	Jewel Tower door, Westminster	(Bridge 2011)	jwlBD5i	1175–1257	66	5.4
German	Westminster Abbey, Deep Chest	(Miles and Bridge 2008)	WMNSTR11	1031–1265	81	5.4

The British sites in the table above use imported boards which have been provenanced on the basis of the where the best dendrochronological matches have been foundTable 2 Dating evidence for the site chronology HNDRNGHM AD 1160–1240 against dated reference chronologies

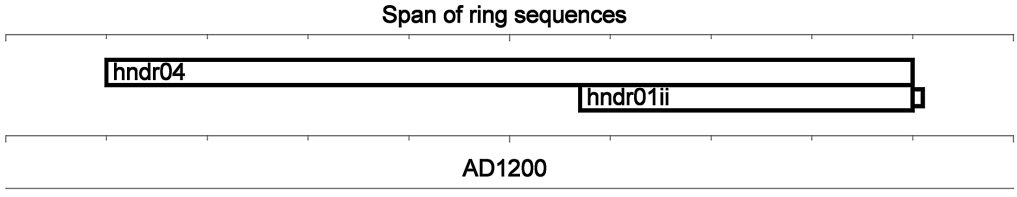

Figure 3 Bar diagram showing the relative positions of overlap of the dated samples, narrow sections representing additional unmeasured rings.

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APPENDIX B

*Dendrochronological Report on Cross-Dating the **Hndrnghm** and Lower Saxonian Chronologies*

Dr Hanns Hubert Leuschner, February 2019

Sample	Area Ref	OVL	Glk	TVBP	TVH	CDI	DateR
hndrnghm	37__10	81	70	7.5	7.0	51	1240
hndrnghm	01__03	81	64	6.5	6.1	41	1240
hndrnghm	35__10	81	64	6.1	4.8	35	1240
hndrnghm	36__10	81	67	5.8	4.4	34	1240
hndrnghm	34__10	81	66	5.6	4.9	34	1240
hndrnghm	Wienhsn	81	64	5.2	4.3	30	1240
hndrnghm	31__10	81	61	5.0	3.7	27	1240

Area Ref: reference number of the area of the chosen Lower Saxonian chronology.
OVL: number of years overlap.
Glk (*Gleichlaufigkeit*): a measure of the correspondence between annual increases and decreases in ring width in the series being compared.
TVBP: *t*-value as calculated by Baillie-Pilcher method.
TVH: *t*-value as calculated by Hollstein method.
CDI: a combined dating index that uses the t and Glk values to give an overall measure of the closeness of the match.
DateR: latest ring date.

Area references

31–37	Lower Saxonian growth-regions
32+32+33	Hill lands in the South
34	Northern border Hill lands
35	Heath East
36	Geest Region Middle Lower Saxony
37	Coastal area North Sea
01	Coastal region Baltic Sea
Wienhsn	Chest chronology (Wienhausen, situated in 35__10)

CONCLUSION

The table shows that, using the t-value calculated by Baillie-Pilcher method, the closest match (t=7.5) is between the **hndrnghm** chronology and the chronology for 'Coastal area North Sea' (area 37__10).

APPENDIX C

Oxford Dendrochronology Laboratory Report 2017/41: *The Dendrochronological Dating of a Chest in the Church of St Margaret the Queen, Buxted, East Sussex* (TQ 485 230)

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September 2017

SUMMARY

Three stiles were sampled (Figure 1). One complete series dated well, the other two had splits in the sequences, and it was only possible to date the outer section from one of these series. The combined dated series covers the period 1141–1309. With only 15 years overlap between the two samples, they were each dated separately in the first instance. The only heartwood-sapwood boundary date obtained was 1309, giving a likely felling date range of 1318–50 for the timber used in the construction of this chest.

SAMPLING

Samples were taken in July 2017. The locations of the samples are described in Table 1. Core samples were extracted using an 8 mm diameter borer attached to an electric drill. They were labelled (prefix **buxt**) and were polished with progressively finer grits down to 400 to allow the measurement of ring-widths to the nearest 0.01 mm. The samples were measured under a binocular microscope on a purpose-built moving stage with a linear transducer, attached to a desktop computer. Measurements and subsequent analysis were carried out using DENDRO for WINDOWS, written by Ian Tyers (Tyers 2004).

RESULTS AND DISCUSSION

Details of the samples are given in Table 1. One series, **buxt03**, remained intact and was dated on its own very readily (Table 2b), but the other two cores contained breaks, with the possibility of missing rings between the samples retained. These were therefore treated as separate units, whilst bearing in mind the likely separations observed, but only one of these sections dated independently, buxt01ii, the outermost rings of the core up to the heartwood-sapwood boundary (Table 2a). There was only 15 years of overlap between the two dated series, but it was observed when the two were combined that the new series produced, **BUXTED**, dated well (Table 2c), although in a few instances with slightly lower t values than with the individual series.

The lack of sapwood makes the interpretation of these dates slightly difficult, although the outer rings of the right front stile are thought to go to the heartwood-sapwood boundary, thus a likely felling date range can be calculated, this being **1318–50** for that timber. The rear stile was also thought to finish at the heartwood-sapwood boundary, but despite several re-measures and checking, there was no match between the ring sequence for this timber and the other timbers, not did the series date

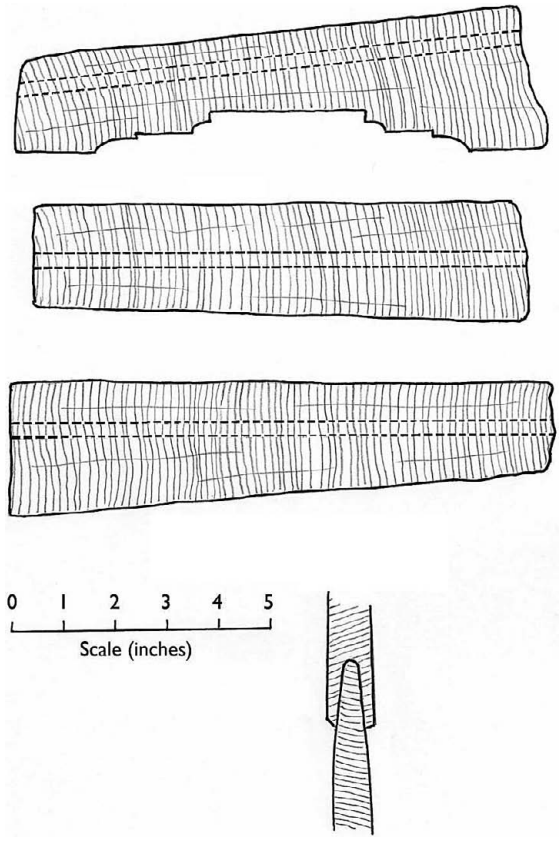

Figure 1 Drawings of the sections of stiles sampled, in order with 01 at the top and 03 at the bottom, indicating the line of the core extracted, along with the unusual V-edged board detail (Dan Miles)

independently against the reference material, so it was not possible to refine this felling date range further. The relative positions of overlap of the two dated sequences are shown in Fig 2, along with the interpreted likely felling date ranges.

The earlier sequence, buxt03, gave best matches against sites mostly to the west of Sussex (Table 2b), but it should be noted that there are many fewer available Sussex and Kent sites to match against this mid-C13th sequence than the later early-C14th

Figure 2 Bar diagram showing the relative positions of overlap of the two dated sequences and their likely felling date ranges.

Table 1 Details of samples taken from elements of the chest at Buxted church

Sample number	Timber and position	Date of series	H/S boundary date	Sapwood complement	No. of rings	Mean width (mm)	Std devn (mm)	Mean sens	Felling date range
buxt01i	Right front stile – inner rings	—	—	—	51	2.13	0.93	0.23	—
* buxt01ii	Right front stile – outer rings	1249–1309	1309	H/S	61	1.59	0.56	0.26	1318–50
buxt02iii	Right rear stile – outer rings	—	—	—	71	1.86	0.56	0.21	—
* buxt03	Rear left stile	1141–1264	—	—	124	2.09	0.52	0.20	after 1273
* = component of site mater **BUXTED**		**1141–1309**	**—**	**—**	**169**	**1.90**	**0.57**	**0.22**	**—**

Key: H/S bdry = heartwood/sapwood boundary — last heartwood ring date; std devn = standard deviation; mean sens = mean sensitivity; NM = not measured.

Note: **buxt02i** and **02ii** are not included in Table 1 as they are very short sequences that could not be matched with any other series. **There are only 15 years of overlap between the two dated sequences, which therefore rely on independent dating.**

Table 2A Dating evidence for the site sequence **buxt01ii AD 1249–1309** against dated reference chronologies

County or region	Chronology name	Reference	File name	Spanning	Overlap (yrs)	*t*-value
Regional Chronologies						
Kent	Kent Master Chronology	(Laxton and Litton 1989)	**KENT88**	1158–1540	61	5.0
London	London Master Chronology	(Tyers pers comm)	**LONDON**	413–1728	6.1	4.2
Site Chronologies						
Hampshire	Monks Cottage, Odiham	(Miles and Haddon-Reece 1996)	MONKS	1166–1300	52	5.6
Kent	Court Lodge Farm, Bilsington	(Arnold and Howard 2009)	BLSNSQ01	1224–1401	61	5.4
Kent	Littlebourne Barn	(Arnold et al 2003)	KLBASQ01	1232–1296	48	4.7
Oxfordshire	The Stores, East Hendred	(Miles and Worthington 2002)	EHENDRD2	1216–1366	61	4.7
Kent	Cowden Church	(Howard et al 1999)	CWDASQ01	1257–1439	53	4.7
Buckinghamshire	Boarstall Tower	(Miles and Worthington 1999)	BOARSTL1	1201–1312	61	4.3

Table 2B Dating evidence for the site series **buxt03 AD 1141–1264** against dated reference chronologies.

County or region	Chronology name	Reference	File name	Spanning	Overlap (yrs)	*t*-value
Regional Chronologies						
Southern England	South Master Chronology	(Hillam and Groves 1994)	**SOUTH**	406–1594	124	5.8
Somerset	Somerset Master Chronology	(Miles 2004)	**SOMRST04**	770–1979	124	5.8
England	Southern Central England	(Wilson et al.2012)	**SCENG**	663–2009	124	5.1
Site Chronologies						
Devon	Chimsworthy Bratton	(Tyers et al. 1997)	chms01	1154–1255	102	6.7
Kent	Chest, St Mary's Church, Norton	ODL unpublished rep 2015/47	NORT21m	1202–1293	63	6.1
Somerset	Meare Farmhouse	(Bridge 2002a)	MEARE	1156–1314	109	6.0
Wiltshire	Dauntsey House, Dauntsey	(Hurford et al. forthcoming)	DSDPSQ02	1122–1355	124	5.6
Gloucestershire	Ingleside, Hawkesbury	(Miles et al. 2010)	INGLE1	1198–1417	67	5.5
Wiltshire	Bremhill Court	(Hurford et al. 2010)	BHBCSQ01	1112–1323	124	5.5
Oxfordshire	Christ Church Chapter House, Oxford	(Worthington and Miles 2003)	CHCHCH	1142–1260	119	5.4
Somerset	Muchelney Abbey	(Bridge 2002b)	MUCHNEY	1148–1498	117	5.4

Table 2c Dating evidence for the site series BUXTED AD 1141–1309 against dated reference chronologies.

County or region	Chronology name	Reference	File name	Spanning	Overlap (yrs)	*t*-value
Regional Chronologies						
Southern England	South Master Chronology	(Hillam and Groves 1994)	**SOUTH**	406–1594	183	6.5
Somerset	Somerset Master Chronology	(Miles 2004)	**SOMRST04**	770–1979	183	6.3
England	Southern Central England	(Wilson et al. 2012)	**SCENG**	663–2009	183	5.8
Site Chronologies						
Devon	Chimsworthy Bratton	(Tyers et al. 1997)	chms01	1154–1255	102	6.4
Somerset	Muchelney Abbey	(Bridge 2002b)	MUCHNEY	1148–1498	162	6.2
Wiltshire	Dauntsey House, Dauntsey	(Hurford et al. forthcoming)	DSDPSQ02	1122–1355	169	6.0
Gloucestershire	Ingleside, Hawkesbury	(Miles et al. 2010)	INGLE1	1198–1417	112	5.8
Sussex	Rhenish Helm, Sompting	(Tyers 1988)	SOMPTING	1182–1292	111	5.5
Somerset	Meare Farmhouse	(Bridge 2002a)	MEARE	1156–1314	154	5.4
Pembrokeshire	St Davids Cathedral, Wales	(Miles et al. 2009)	STDAVID1	1087–1292	152	5.4
Oxfordshire	Christ Church Chapter House, Oxford	(Worthington and Miles 2003)	CHCHCH	1142–1260	119	5.4

sequence. This latter sequence matched more local material, largely from Kent, and including a chest from Norton Church in Kent, which we dated previously. This difference is also reflected in the regional masters matched by each of the sequences – these being collections of individual site series from the areas concerned, often regarded as a more reliable guide to provenancing. Perhaps too much can be read into these minor geographical differences with just two sequences, but they may hint at different origins for the two timbers.

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